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ABSTRACT

This document contains standards for an articulated secondary and postsecondary curriculum in aerospace technology. The curriculum standards can be used to ensure that vocational programs meet the needs of local business and industry. The first part of the document contains a task list and student performance standards for the aerospace technology curriculum. It is followed by seven modules of curriculum standards, consisting of tasks, performance objective, and enabling objectives for the following curriculum areas: history of flight, principles of flight, aerospace vehicles, aerospace environments, aerospace and international issues, the future of aerospace, and employability skills. A list of nine references to resource guides, curriculum guides, handbooks, model kits, and videotapes is provided. (KC)

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Vo. Ed. #260

Curriculum Guide for AEROSPACE TECHNOLOGY

ED351611

Invest in Success

IDAHO VTE VOCATIONAL TECHNICAL EDUCATION

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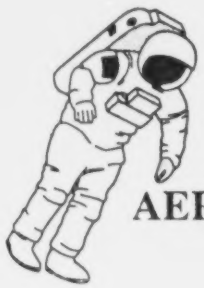

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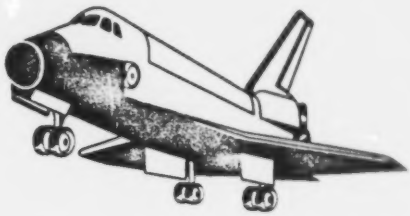

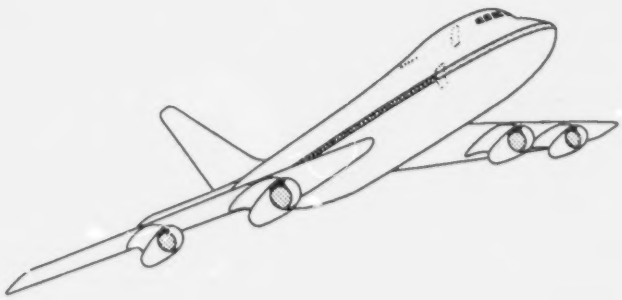

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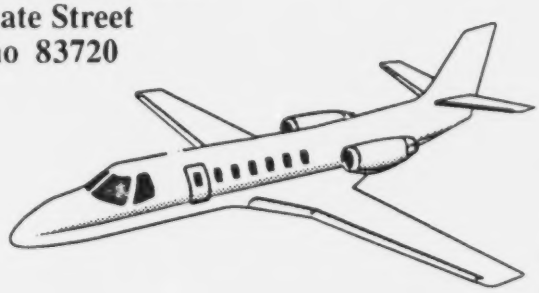

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INTRODUCTION

The Idaho Vocational Curriculum Guide project was a cooperative effort among secondary and post secondary instructors and administrators to develop competency-based program standards for curriculum content for the Aerospace Technology course.

The content of this document is directed toward the area of Aerospace Technology - not toward a specific institution in the State.

The benefits to students and institutions derived from the development of these curriculum standards should be considerable. Articulation of students from secondary to post secondary programs will be aided through a single set of curriculum standards. Local evaluation of programs and curricula can be accomplished using the standards as an objective measure. Institutions will be able to utilize the curriculum standards in a flexible manner to assure that vocational programs meet the needs of local business and industry.

ACKNOWLEDGMENTS

Planning, developing, and writing this publication required the coordinated efforts of many people involved in Vocational Technical Education in the State of Idaho. Appreciation is expressed to the instructors and administrators who offered support, encouragement, and technical assistance in the development of this document. Thanks goes to Michael Pate, Jerome Junior High School; Michael Shore, Boise State University; Ray Mikelson, Coeur d'Alene High School; Lynn Marsh, Meridian Academy.

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Wood River Middle School

Dr. Don Eshelby
Director of Program Services

Rob Campbell
Industrial Technology Supervisor

TASK LIST

STUDENT PERFORMANCE STANDARDS
EFFECTIVE DATE: APRIL 1992

PROGRAM AREA: Aerospace Technology

01.0 HISTORY OF FLIGHT -
The student will be able to:

01.01 Investigate the evolution of flight technology.
01.02 Identify early flight attempts.
01.03 Study the effects of world issues on the development of flight.

02.0 PRINCIPLES OF FLIGHT -
The student will be able to:

02.01 Gain an understanding of basic aerodynamic principles.
02.02 Apply an understanding of aircraft motion and control.
02.03 Demonstrate the operation of Aircraft propulsion.
02.04 Demonstrate the principles of navigation in flight.

03.0 AEROSPACE VEHICLES, DIFFERENCES OF AIRCRAFT AND VEHICLES -
The student will be able to:
03.01 Identify each aerospace vehicle type and explain the properties of flight associated with each type.
03.02 Apply the principles of flight to each type of aerospace vehicle.

04.0 AEROSPACE ENVIRONMENTS -
The student will be able to:
04.01 Survey the Galactic Community.
04.02 Survey the Solar System.
04.03 Survey the Earth's atmosphere.
04.04 Analyze the effects space flight has on the human body.
04.05 Study the effects of Man on Space.

05.0 AEROSPACE AND INTERNATIONAL ISSUES -
The student will be able to:
05.01 Identify the effects of international issues on aerospace.
05.02 Evaluate the effects that aerospace has had on international issues: environment, world trade, government policies, etc.

06.0 THE FUTURE OF AEROSPACE -

The student will be able to:

6.01 Forecast possible advancements in prolonged space travel.
6.02 Forecast possible advancements in artificial environments.
6.03 Forecast possible advancements in space-related production technology.
6.04 Forecast possible advancements in biotechnology.
6.05 Forecast possible advancements in clothing.
6.06 Forecast possible advancements in entertainment and recreation.
6.07 Forecast possible advancements in transportation technology.
6.08 Describe present and future aerospace careers.

07.0 EMPLOYABILITY SKILLS -

The student will be able to:

07.01 Identify employment opportunities.
07.02 Apply employment-seeking skills.
07.03 Interpret employment capabilities.
07.04 Demonstrate appropriate work behavior.
07.05 Maintain safe and healthy environments.
07.06 Maintain a business-like image.
07.07 Maintain working relationships with others.
07.08 Communicate on the job.
07.09 Adapt to change.
07.10 Demonstrate a knowledge of business.
07.11 Perform mathematical skills.

Module 1 - History of Flight

1.01 TASK: Investigate the evolution of flight technology.

PERFORMANCE OBJECTIVE: Describe the technological base available to early flight attempts.

ENABLING OBJECTIVES:

1. Explain the early desire of man to fly, through their myths and legends.
2. Identify at least one of the many contributions Leonardo da Vinci made to the understanding of flight.
3. Construct a time line of the pre-flight era until the 1903 Wright brothers historic flight.
4. Research and report on two pre-flight era technology pioneers and state their contribution to modern aviation.
5. Identify attempts by the Chinese (as early as 1000 A.D.) which may have allowed them to fly.
6. Investigate and report on the technological contributions made by Tornicelli, Von Guericke and Pascal.
7. Compare and evaluate problems associated with early heavier-than-air and lighter-than-air flight.
8. Research and report on "wing warping" v.s. ailerons in early flight technology.
9. Compile a list of hardships an early aviator/inventor would encounter in his quest to design and fly a prototype aircraft.
10. Create a mobile showing the history of flight with the earliest "flying machines" at the top and the latest at the bottom, including both lighter-than-air and heavier-than-air crafts.
11. Construct a model hot-air-balloon.

1.02 TASK: Identify early flight attempts.

PERFORMANCE OBJECTIVE: Given the appropriate resource materials, students will chronologically compile the evolution of flight.

ENABLING OBJECTIVES:

1. Develop a chronological graph showing the evolution of aerospace flight from 1903 to present.
2. Prepare a report on the evolution of flight for the period 1904 to 1919.

3. Research and report on various fabrics used on the "skin" of aircraft from 1903 to present.
4. Report on the evolution of flight for the period 1919 to 1939.
5. Make a collection of drawings showing different types of wings used on aerospace crafts over the years.
6. Prepare a report on the evolution of flight for the period 1939 to the end of World War II.
7. Choose a historic flight, gather facts about the flight, and develop a report including a map or chart.
8. Prepare a report on the evolution of flight for the period 1945 to 1958.
9. Describe the life of the dirigible and the reason for it's extinction from modern commercial.
10. Prepare a report on the evolution of flight for the period 1958 to present.
11. Give a technical report on various aerospace craft.
12. Compute the number of miles flown by a biplane built in August of 1918, flown an average of 3 hours per month until December of 1990, if its ground speed is 50 miles per hour.

1.03 TASK: Study the effects of world issues on the development of flight.

PERFORMANCE OBJECTIVE: Given appropriate resources students will be able to compare and contrast the influences of world issues on the advancement of flight.

ENABLING OBJECTIVES:
1. Identify and sketch the airship used in the Civil War and list its contributions.
2. Discuss the military role of the airplane in World War I.
3. Explain the main contribution the barnstormers made to aviation.
4. Research and report on the effects of the Air Mail Act of 1925 on aviation.
5. Describe the Air Commerce Act of 1925 and its benefits to the commercial airline industry.
6. Research and report on the reasons for the expansion of the Army Air Corps in 1939.
7. List several aerospace advances that were made during World War II.
8. Identify various types of aircraft used in World War II.

9. Prepare a report on the growth of general aviation after World War II.
10. Describe America's reaction to the Soviet launch of "Sputnik I" on October 4, 1957.
11. Describe one of the biggest reasons for the space race between the United States and Soviet Union.
12. Construct a time line graph of the United States v.s. Soviet Union space travel beginning October 4, 1957 to present.
13. Select a large aircraft company and prepare a report using company publications on its growth from infancy to present.

Module 2 - Principles of Flight

2.01 TASK: Gain an understanding of basic aerodynamic principles.

PERFORMANCE OBJECTIVE: Given the basic information regarding the effects of physical laws on flight, students will conduct experiments in aerodynamics principles.

ENABLING OBJECTIVES:

1. Explain the principle of atmosphere pressure.
2. Define weight and density.
3. Explain the interaction among pressure, density, weight, mass and temperature.
4. Distinguish the difference between Newton's laws of motion.
5. Describe how airspeed, camber, temperature, altitude and density contribute to lift.
6. State the relationship between thrust and drag.
7. Define drag, center of gravity, thrust, lift, gravity.
8. State the relationship between thrust and drag.
9. Describe Bernoulli's principles.
10. Define terms associated with aeronautics.

2.02 TASK: Apply an understanding of aircraft motion and control.

PERFORMANCE OBJECTIVE: Given the appropriate apparatus, students will model the principles of flight.

ENABLING OBJECTIVES:

1. Label the parts of an airplane.
2. Identify the three types of landing gear.
3. Explain the term "reciprocating engine".
4. Define terms associated with flight control.
5. Define airfoil, camber and chord.
6. Identify the areas found on the cambered wing.
7. Differentiate among chord line, trailing edge and leading edge.
8. Explain the difference between relative wind, angle of incidence and angle of attack.
9. Describe the surfaces and devices used to control the flight of an aircraft.
10. Identify the three axis of rotation.
11. Explain how a propeller assists in creating lift.

2.03 TASK: Demonstrate the operation of Aircraft propulsion systems.

PERFORMANCE OBJECTIVE: Given instruction on various propulsion systems, students will analyze and compare propulsion systems.

ENABLING OBJECTIVES:

1. Identify the control system of hot-air balloons.
2. Explain why hot-air balloons are not dependable carriers.
3. Describe the difference between a sail plane and a powered plane.
4. Describe the three kinds of soaring.
5. Explain the difference between soaring and hang gliding.
6. Label the parts of a reciprocating engine.
7. Identify the actions in the four stroke cycle of the reciprocating engine.
8. Compare the principle of flight of a fixed wing craft with that of a helicopter.
9. Name the propeller that can change its pitch automatically to suit the needs of the engine.
10. Describe the turbojet engine operation.
11. List the advantages of the turbofan engine.
12. Describe turboprop engine operation.
13. Explain the operation of the ramjet engine.

2.04 TASK: Demonstrate the principles of navigation in flight.

PERFORMANCE OBJECTIVE: Given resource material, instruments, and related equipment, the student will be able to demonstrate the ability to navigate an aircraft.

ENABLING OBJECTIVES:

1. Describe the specific aerial maneuvers an airplane can make.
2. Identify the actions needed for carrying out flight maneuvers.
3. Identify the basic flight instruments and their functions.
4. Describe the operations of the gyroscopes.
5. Identify the instrument that records the speed of the engine.
6. Describe the use of a flight computer to determine direction, and true speed.

7. Calculate airspeed in nautical miles from known distances on a road map.
8. Describe the use of landmarks and maps in navigation.
9. Identify instruments used in navigation.

Module 3 - Aerospace Vehicles, Differences of Aircraft and Vehicles

3.01 TASK: Identify each aerospace vehicle type and explain the properties of flight associated with each type.

PERFORMANCE OBJECTIVE: Given examples of a variety of aerospace vehicles, the student will be able to compare a variety of aerospace vehicles.

ENABLING OBJECTIVES:

1. Identify types of aerospace vehicles, including:
   a. Lighter-than-aircraft categories such as, free air balloons, rigid airships, semi and non rigid airships.
   b. Airplanes, gliders, general aviation airplanes, air carrier airplanes, military airplanes, utility airplanes, monoplanes, biplanes, single and multi-engine airplanes.
   c. Rotorcraft, such as autogyros and helicopters and to be able to classify them: passenger, utility, rescue craft, and military.
   d. Special class aircraft and categories, such as tilt-rotor, vertical take-off and landing craft (VTOL), short take-off and landing, and lifting bodies.
   e. Aerospace vehicles, space shuttles (STS), aerospace plane.
   f. Rockets and their classes and categories.

2. Identify characteristics such as primary source of lift, power plant(s) if any, vehicle instrumentation, comfort and security considerations, control surfaces, maintenance costs and complexity, maximum airspeed and navigation aids, of various aerospace vehicles.

3.02 TASK: Apply the principles of flight to each type of aerospace vehicle.

PERFORMANCE OBJECTIVES: Given the appropriate resource material, the student will describe the operation and application of various types of aerospace vehicles.

ENABLING OBJECTIVE:

1. Describe the application of control surfaces and the aerodynamic qualities of lighter than air aircraft.

2. Describe the application of control surfaces and the aerodynamic qualities of airplanes.
3. Describe the application of control surfaces and the aerodynamic qualities of rotor craft.
4. Describe the application of control surfaces and the aerodynamic qualities of special class aerospace vehicles.
5. Describe the application on control surfaces, power plants and the aerodynamic qualities of aerospace craft.
6. Describe the application of control surfaces, power plants and the aerodynamic qualities on rockets.
7. Describe the function of and interpret flight instruments.
8. Discuss the properties of a gyroscope and their application to aircraft, space vehicles and satellite control.
9. Demonstrate gyro instrumentation.
10. Describe the components and operation of basic fuel systems.
11. List the components of a basic electrical system and explain their functions.

Module 4 - Aerospace Environments

4.01 TASK: Survey the Galactic Community.

PERFORMANCE OBJECTIVE: Summarize the physical properties of the Universe.

ENABLING OBJECTIVES:

1. Describe the "big bang" theory of the formation of the universe.
2. Describe the major steps in the life cycle of a star.
3. Diagram the characteristics of stars and size relationships.
4. Define units of measurement related to astronomy.
5. Diagram the size relationships and distances related to our solar system, galaxy, and universe.
6. Diagram and name star groups.
7. Describe how people have used stars in folklore, superstition, and navigation.
8. Evaluate and compare astrology and astronomy.
9. Evaluate the probability of life on other planets in and out of our solar system.
10. Describe the motion of the planets and the laws of physics that govern them.
11. Describe the characteristics of meteoroids, comets, and asteroids.
12. Describe examples of the laws related to gravity.
13. Describe the distances and travel time from earth to other planets, stars, and galaxies.
14. Evaluate the benefits of manned and unmanned space travel.
15. Illustrate how the analysis of light from other stars can help us understand their composition.
16. Define "red shift".
17. Describe how red shift can be used to investigate the life cycle of stars.
18. Describe the space exploration projects to date and summarize their findings.
19. List reasons for exploration of space.
20. Predict the future of space travel within 50 years and 150 years.

4.02 TASK: Survey the Solar System.

PERFORMANCE OBJECTIVE: Summarize the physical properties of the Solar System.

ENABLING OBJECTIVES:

1. List the steps in the formation of our solar system on a time line.
2. Describe the major features of planets in our solar system.
3. Diagram the major features and characteristics of our sun.
4. List the time it takes for light to travel from Earth to each planet in our solar system and to planets outside of our solar system.
5. Compare the major features of the earth to those of other planets.
6. Survey the major features of our moon and compare them to the moons of other planets.
7. Describe the effects of the moon's gravity on earth relating to tides, and other natural phenomena.
8. Chart the physical properties of each of the planets in our solar system.
9. Illustrate the distance from the sun to other planets in our solar system using an appropriate scale.
10. List the accomplishments of NASA in the exploration of our solar system.
11. Design and build a model of a possible space station, moonbase, or Mars colony.
12. Describe the advantages and disadvantages of various space vehicles.
13. Recommend a realistic timetable of events related to the exploration of our solar system.
14. List the considerations involved (ie. life support, vehicle design, new technologies, etc.) in sending people to Mars.
15. Chart the time required for people to travel from Earth to each of the planets using various propulsion systems.
16. Hypothesize on the possibility of developing a permanent Mars colony.
17. List the advantages and disadvantages of a multinational space exploration effort.

4.03 TASK: Survey the Earth's atmosphere.

PERFORMANCE OBJECTIVE: Summarize the physical properties of the Earth's atmosphere.

ENABLING OBJECTIVES:

1. Graph the composition of various gases present in the earth's atmosphere.
2. Compare the atmospheric composition of the earth with other planets in our solar system.
3. List the characteristics of the various layers of the earth's atmosphere using an appropriate scale.
4. Describe the earth's magnetosphere.
5. Describe the effect that people have had on the earth's atmosphere.
6. Analyze current data and predict changes in the earth's atmosphere based on trends.
7. Analyze the possible effects of carbon dioxide and the greenhouse effect.
8. Research the changes in the ozone layer and predict possible future effects on vegetation and people.
9. Diagram air pressure differentials in layers of the atmosphere.
10. Describe the atmospheric factors that influence the earth's weather.
11. Define terms related to weather.
12. Describe the effects of heat on wind currents in the atmosphere.
13. Chart weather patterns.
14. Collect weather-related data using appropriate measurement techniques.
15. Predict weather patterns based on data collected.
16. Describe the destructive effects of weather related to property damage and loss of life.
17. Analyze moisture content in the atmosphere and its relationship to temperature and pressure.
18. Describe weather phenomena that is related to air travel safety.
19. Analyze the short-term climate changes in various regions of the United States and the world.

4.04 TASK: Analyze the effects space flight has on the human body.

PERFORMANCE OBJECTIVE: Evaluate the effects of micro-gravity, radiation, and changes in inertia (acceleration and deceleration), on human beings.

ENABLING OBJECTIVES:

1. Describe the physiological importance of oxygen related to human life.
2. Describe the symptoms of hypoxia (lack of oxygen) and the possible harmful effects associated with high altitude flight.
3. Diagram the oxygen content in the atmosphere related to altitude.
4. Diagram the atmospheric air pressure related to altitude.
5. Describe the condition of anoxia (life threatening lack of oxygen).
6. Compare the life support systems related to diving and high altitude flight.
7. Describe the hazards of hyperventilation related to high altitude flight.
8. Describe the physiological effects and prevention factors related to the bends.
9. Diagram the thermal characteristics of the earth's atmosphere.
10. Describe the technology involved in providing a controlled life support system for space flight.
11. Design a life support system that might be used to protect astronauts on various planets.
12. Describe the sources and properties of various forms of radiation.
13. Describe the effects of radiation exposure on human cells.
14. Design a practical protection shield that could protect space travelers from long term radiation exposure.
15. Describe the effects of rapid acceleration and deceleration on the human body.
16. Describe the physics of microgravity.
17. Describe the short and long-term effects of microgravity on humans.
18. Design an exercise system that would help prevent the detrimental effects of microgravity on humans.

4.05 TASK: Study the effects of Man on Space.

PERFORMANCE OBJECTIVE: Analyze and discuss the projected effects and impacts on the atmospheric environment.

ENABLING OBJECTIVES:

1. Describe the location and hazards related to "space junk".
2. Design a time line of technology events that have had an effect on the earth's atmosphere.
3. Describe the pollution of the atmosphere due to air and space travel.
4. Research and perform environmental assessment techniques in an effort to identify pollution sources.
5. Recommend changes that would improve the environment in your community.
6. Invent a "machine" that could recycle all human waste for reuse.
7. Design a system that would recycle human waste produced on board a long term space flight.
8. Survey local, state, and national officials with regard to their concern for the environment.
9. Produce posters that explain the detrimental effects of common household products on the atmosphere.
10. Predict the best and worse possible future atmosphere.
11. Research the most hazardous pockets of pollution on a world map.

Module 5 - Aerospace and International Issues

5.01 TASK: Identify the effects of international issues on aerospace.

PERFORMANCE OBJECTIVE: Given the responsibility to research the issues, analyze and present or debate impacts of international issues, summarize findings and make recommendations.

ENABLING OBJECTIVES:

1. Evaluate economic policies of the past with economic policies for future space exploration.
2. Discuss possibilities of international cooperation with regard to future exploration.
3. Discuss space laws as they apply to private, national, and international property.
4. Identify security policies and the accepted channel to amend or incorporate new laws.
5. Analyze fundamental principles that guide the conduct of military space activities.
6. Research and report on current international space agreements.
7. Identify the first official national space policy.
8. List 10 space policies (laws).
9. Research and report on the direction and goals relating to international aerospace activities provided by each United States President from Eisenhower to the present.
10. Identify the role and mission of the Department of Defense concerning National Space Policy.
11. Explain the concept of sovereignty of airspace.
12. Explain the significance of the Paris Convention of 1919 as it relates to the right to fly.
13. List the "five air freedoms" established by the 1944 convention on International Civil Aviation.
14. Explain what is meant by International Policy.
15. Describe how space related conflicts between nations are resolved.
16. Describe the purpose of the Strategic Defense Initiative.
17. Describe the limitations imposed on the United States and Soviet Union by the Strategic Arms Limitation Talks (SACTI and SAIL II).
18. Explain the responsibilities of the National Transportation Safety Board.

19. Discuss the procedure and justification for federal regulation of aircraft.
20. Describe the federal requirements pertaining to personnel certification, general operating rules, and accident reporting.
21. Discuss the effects of FAA regulations on aviation safety.

5.02 TASK: Evaluate the effects that aerospace has had on international issues: environment, world trade, government policies, etc.

PERFORMANCE OBJECTIVE: Given appropriate resource materials, address the relationships between aerospace and the issues that determine international policies.

ENABLING OBJECTIVES:

1. Determine how all explorations of each age have changed our social relationships.
2. Determine solutions for future financing for space exploration.
3. Outline national goals and cooperative events for future space exploration.
4. Examine the limits or enhancements of expansion and development of aerospace vehicles, navigational systems, and biosphere environments.
5. Identify environment issues that may be threatened by increasing our mobility of future space expansion.
6. Describe the economic impact that airline and aerospace industries have on our society.
7. Compare air carriers, air cargo and general aviation in terms of the number of passengers and products carried and the number of airports served in our region.
8. Describe two sociological changes which have been brought about by air transportation.
9. Describe the problems facing air transportation because of increased costs and government regulations.
10. Explain the purpose of the state and regional disaster airlift (SARDA) plan.
11. Describe the importance of space technology in the areas of weather satellites, earth survey satellites, and communication satellites.
12. List two spin-off products of the space program.

13. Describe the aerospace industry in terms of employment, payroll, sales, profit, exports, imports, balance of payments, and backlog.
14. Explain the problem faced by our aerospace manufacturers in paying for development of new aircraft and why foreign competition is often considered unfair by United States manufacturers.
15. List some of the new technological improvements that might be in the next generation of commercial aircraft.
16. Explain how the aerospace age has affected education and training.
17. Explain why Aerospace Technology Education is important to a nation like the United States.
18. Identify aerospace courses being taught in vocational/technical schools, four-year colleges and universities.
19. Outline possible educational practices to meet the expectations of tomorrow.

Module 6 - The Future of Aerospace

6.01 TASK: Forecast possible advancements in prolonged space travel.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to the psychological and physiological aspects of living in space.

ENABLING OBJECTIVES:

1. Identify current and possible physiological problems caused by extended space flights in microgravity environments.
2. Explain the fundamental theories, physiological principles and techniques associated with physical and emotional well-being during air and space flights.
3. Discuss such topics as induced hibernation or cyrogenic storage applied to humans on long duration interplanetary space flights.
4. Describe the effects and symptoms of hypoxia, hyperventilation, vertigo, and air-sickness.
5. Design and build a model of a space station with artificial gravity.
6. Design a model space station that might solve physiological problems.
7. Develop ideas for sleeping accommodations in microgravity.
8. Discuss the stress and strain upon interpersonal relationships among space travelers confined to a limited space, using role playing to emphasize the findings.
9. Discuss the possibility that families will eventually inhabit space stations.
10. Explore the topic of human psychological dependency on gravity, whether natural or artificial.
11. Discuss the inevitability of pets in space and animal behavior in microgravity environments.
12. Discuss ways to solve the human need for variety and open space in space colony configurations.

6.02 TASK: Forecast possible advancements in artificial environments.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to the construction and maintenance of biospheres.

ENABLING OBJECTIVES:

1. Explain the feasibility and desirability of establishing biospheres in space to augment regularly supplied (earth) products.
2. Use commonly available household products to build a biosphere environment model.

6.03 TASK: Forecast possible advancements in space-related production technology.

PERFORMANCE OBJECTIVE: - Forecast possible future of manufacturing, earth exploration, and resources of space.

ENABLING OBJECTIVES:

1. Research the use of EROS and LANDSAT type satellites, and the increasing use of such satellites to monitor atmospheric conditions and long-range patterns.
2. Design a hypothetical space mining and manufacturing laboratory in stationary orbit at the point of earth-moon libration.
3. List sources of mined substance, such as asteroids, and possible products, such as nickel, perfectly spherical ball bearings, or high resolution optics.
4. Theorize about possible development of nuclear, ionic, might utilize solar and nuclear radiation in a variety of ways to convert garbage into additional energy and inert mineral-like substances.
5. Predict advancements in material technology that might provide higher strength, conductivity, insulative properties.
6. Describe the control of robots by artificial intelligence.
7. Discuss pros and cons of the development of robotic artificial intelligence
    A. for lunar and Martian mining operations.
    B. for collecting space junk.
    C. for oceanographic applications.
    D. for earth bound hazardous material handling.

E. for operation of civilian and military aviation applications.

8. Create a model solar cell array that is capable of following the path of the sun on earth to provide an alternative power source of electricity.

6.04 TASK: Forecast possible advancements in biotechnology.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to living things.

ENABLING OBJECTIVES:

1. Design a futuristic meal for long term space travelers.
2. Explore the value of genetic engineering with regards to crop production in space and discuss the pros and cons of such a program.
3. Describe model communities to be built in hostile environments utilizing nuclear power plants using low level safe radioactive fuels.
4. Design a city of the future considering the possibility of multiple functions and capabilities such as electricity generation, water distillation/pumping, water purifying, solid waste treatment, hot water production, air-conditioning, etc.

6.05 TASK: Forecast possible advancements in clothing.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to the design and construction of clothing.

ENABLING OBJECTIVES:

1. Design various articles of clothing that would be utilitarian without sacrificing fashion.
2. Describe possible developments in fabrics that lend themselves to enhancing personal hygiene and comfort.

6.06 TASK: Forecast possible advancements in entertainment and recreation.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to leisure time activities in space.

ENABLING OBJECTIVES:

1. Make predictions on the impact of computerization and electronics upon future music.
2. Draw possible artistic conceptions of Martian and lunar space bases and render to give desired visual effects.
3. Using pictures of the heavenly bodies contained in our solar system, create a collage or a model depicting these bodies.
4. Design a game that could be played safely in microgravity.

6.07 TASK: Forecast possible advancements in transportation technology.

PERFORMANCE OBJECTIVE: - Given an appropriate background in aerospace technology, predict future accomplishments related to mass transit or other modes of transportation.

ENABLING OBJECTIVES:

1. Design and construct model gliders that could be launched from "mother" aircraft that is assigned a specific high altitude "flyway."
2. Discuss the potential of one "mother ship" that could "piggy-back" up to six gliders that could be released at specific coordinates to glide to a designated airport with their cargo and/or passengers.
3. Design and build a model of commuter airports that would accommodate short takeoff and landing vehicles with the ability to cruise at slightly subsonic speeds.
4. Build a model of possible rapid transit systems linking the airports with business centers.
5. Develop models of passenger capsules that could be used in land travel would increase survivability of person using it in the event of an accident. Use a raw egg as the passenger and simulate a crash.
6. Build models of single-stage and two-stage space planes capable of low orbit, intercontinental flight.
7. Build cutaway models of ramjet, turbojet, and scramjet engines.

6.08 TASK: Describe present and future aerospace careers.

PERFORMANCE OBJECTIVE: - Given appropriate career information, identify aerospace career interests.

ENABLING OBJECTIVES:

1. Describe an occupational field to explore and describe the future applications and possible advancements in technology that would contribute to the well-being of human environment.
2. Discuss how future advancements in aerospace technology will impact the educational process for future students.
3. Discuss the vast number of pilot and non-pilot professional career opportunities in the aviation and aerospace industry.
4. Discuss physical, mental, emotional, and educational requirements, along with privileges, benefits, and remuneration of aerospace careers.

Module 7 - Employability Skills

7.01 TASK: IDENTIFY EMPLOYMENT OPPORTUNITIES

PERFORMANCE OBJECTIVE: Given the information resources of a library, obtain and complete the information needed to seek a job.

ENABLING OBJECTIVES:

1. Identify the requirements for a job.
2. Investigate educational opportunities.
3. Investigate occupational opportunities.
4. Locate resources for finding employment.
5. Confer with prospective employers.
6. Identify job trends.

7.02 TASK: APPLY EMPLOYMENT-SEEKING SKILLS

PERFORMANCE OBJECTIVE: Given appropriate information, locate a job opportunity, prepare and take an interview, complete the required tests, forms and applications, and evaluate the job opportunity.

ENABLING OBJECTIVES:

1. Locate a job opening.
2. Complete a resume.
3. Prepare of an interview.
4. Participate in a interview.
5. Complete tests required.
6. Complete forms required.
7. Complete an application letter.
8. Complete a follow up letter.
9. Complete an acceptance letter.
10. Evaluate a job offer.
11. Evaluate a job rejection.

7.03 TASK: INTERPRET EMPLOYMENT CAPABILITIES

PERFORMANCE OBJECTIVE: Given the assignment to explain how personal capabilities make individuals employable, demonstrate how to match skills and experience to a job.

ENABLING OBJECTIVES:
1. Match personal interest to job area.
2. Match personal aptitudes to job area.
3. Verify personal abilities.
4. Identify an immediate work goal.
5. Develop a career plan.

7.04 TASK: DEMONSTRATE APPROPRIATE WORK BEHAVIOR

PERFORMANCE OBJECTIVE: Given the responsibility of an employee in a new job, demonstrate knowledge of appropriate behavior in the workplace.

ENABLING OBJECTIVES:
1. Exhibit dependability.
2. Demonstrate punctuality.
3. Follow rules and regulations.
4. Explain the consequences of dishonesty.
5. Complete assignments accurately and on time.
6. Control personal emotions.
7. Take responsibility for decisions and actions.
8. Take pride in work and be a loyal worker.
9. Learn to handle pressures and tensions.
10. Demonstrate the ability to set priorities.
11. Demonstrate problem solving skills.

7.05 TASK: MAINTAIN A SAFE AND HEALTHY ENVIRONMENT

PERFORMANCE OBJECTIVE: Given the responsibility of an employee in a new job, demonstrate knowledge of safety in the workplace.

ENABLING OBJECTIVES:
1. Comply with safety and health rules.
2. Select correct tools and equipment.
3. Utilize equipment correctly.
4. Use appropriate action during emergencies.

5. Maintain clean and orderly work area.
6. Identify and locate Materials Safety Data Sheets (MSDS).

7.06 TASK: MAINTAIN A BUSINESS-LIKE IMAGE

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job with a new employer, demonstrate actions and behaviors that project a business-like image.

ENABLING OBJECTIVES:
1. Participate in company or agency orientation.
2. Demonstrate knowledge of company or agency products or services.
3. Exhibit positive behavior.
4. Read current job-related publications.
5. Support and promote employer's company image and purpose.
6. Maintain appearance to comply with company standards.

7.07 TASK: MAINTAIN WORKING RELATIONSHIPS WITH OTHERS

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job with a new employer, demonstrate the ability to work with others.

ENABLING OBJECTIVES:
1. Work productively with others.
2. Show empathy, respect, and support for others.
3. Demonstrate procedures and assist others when necessary.
4. Recognize problems and work toward their solution.
5. Minimize the occurrence of problems.
6. Channel emotional reactions in positive ways.

7.08 TASK: COMMUNICATE ON THE JOB

PERFORMANCE OBJECTIVE: Given the responsibility of performing the duties of a new job with a new employer, demonstrate the ability of successfully communication with others.

ENABLING OBJECTIVES:
1. Read and comprehend written communications and information.
2. Use correct grammar
3. Speak effectively with others.

4. Use job-relates terminology.
5. Listen attentively.
6. Write legibly.
7. Use telephone etiquette.
8. Follow written and oral directions.
9. Ask questions.
10. Locate information needed to accomplish tasks.
11. Prepare written communication.
12. Utilize keyboarding skills.
13. Utilize computer skills.

7.09 TASK: ADAPT TO CHANGE

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job with a new employer, demonstrate the ability to adapt to changes.

ENABLING OBJECTIVES:
1. Recognize the need to change.
2. Demonstrate a willingness to learn.
3. Demonstrate flexibility.
4. Participate in continuing education.
5. Seek challenge in the workplace.
6. Adjust goals and plans when necessary.

7.10 TASK: DEMONSTRATE A KNOWLEDGE OF BUSINESS

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job with a new employer, demonstrate a knowledge of the role of business, employees, and the free enterprise system in society.

ENABLING OBJECTIVES:
1. Explain the role of business in the free enterprise system.
2. List the responsibilities of employees.
3. Identify the responsibilities of managers and employers.
4. Discuss the opportunities for business ownership or management.
5. Describe the planning required to start a business.
6. Discuss the importance of business meetings.

7.11 TASK: PERFORM MATHEMATICAL SKILLS

PERFORMANCE OBJECTIVE: Given mathematics problems associated with technology applications, solve the problems accurately within a specified time period.

ENABLING OBJECTIVES:

1. Add and subtract whole numbers, decimals, and fractions.
2. Multiply and divide whole numbers, decimals, and fractions.
3. Convert percents, fractions, and decimals.
4. Convert measurement units using English and SI (metric).

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